

Analysis of the Overarching Issues Related to the National Stone, Sand & Gravel - R.J. Lee Group Report Conclusions that EPA Erred in Measuring Asbestos Concentrations in El Dorado Hills.

Issue	NSSGA - R.J. Lee Position / Allegation	Reasons Why NSSGA - R.J. Lee May Be Taking the Position	Region 9 Response	Basis for Region 9 Response
<p>Cleavage Fragments*</p> <p>*Cleavage fragment is a geologic term which refers to structures that form when non-fibrous forms of asbestos minerals split along crystallographic planes, as opposed to asbestos fibers which form from crystalline growth.</p>	<p>EPA misidentified cleavage fragments as asbestos fibers. Cleavage fragments are "not known to cause asbestos-like disease."</p>	<p>1) Excluding cleavage fragments excludes a large part of asbestos population from regulation or health consideration</p> <p>2) Excluding cleavage fragments greatly reduces the number of asbestos structures detected in El Dorado Hills</p>	<p>a) There are no well-designed studies that have specifically compared the toxicity of exposure to cleavage fragments to exposure to fibers. The historic epidemiological studies that form the basis for asbestos health knowledge probably included cleavage fragments in their exposure measurements. In the absence of data to the contrary, it is prudent public health policy to assume that cleavage fragments have similar toxicity to asbestos structures of the same dimension and chemical composition.</p> <p>b) There are no recognized analytical protocols which can distinguish between a cleavage fragment and a fiber of the same dimension and chemical composition.</p>	<p>a) The EPA health position is shared by ATSDR, NIOSH, American Thoracic Society.</p> <p>b) There are no recognized analytical methods, including those used by EPA, NIOSH, MSHA, ASTM, and ISO which differentiate between cleavage fragments and fibers.</p> <p>The R.J. Lee method for distinguishing cleavage fragments has been found to be subjective and scientifically unacceptable.</p> <p>A USGS expert has stated that it is difficult, if not impossible, to tell the difference between a cleavage fragment and a fiber under the microscope on a fiber by fiber basis.</p>

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Length to Width Ratio	EPA overstated the fiber concentrations in the El Dorado air samples by counting structures with a 3:1 or greater length to width ratio when the analytical method EPA used, ISO 10312, says to count structures with a 5:1 ratio.	<p>1) Stating that EPA misapplied the analytical method makes the Agency appear technically incompetent and untrustworthy.</p> <p>2) Excluding structures in the 3:1 to 5:1 range greatly reduces the fiber concentrations found in the EPA air samples.</p>	<p>a) Annexes C and E of the ISO 10312 method clearly authorize counting of structures with a 3:1 aspect ratio if the data are to be used for exposure assessment or risk assessment purposes.</p> <p>b) 3:1 structures (PCME fibers) form the basis for EPA's IRIS toxicity database and the asbestos risk models of Cal/EPA, WHO, and other federal and international organizations.</p>	b) The PCME classification was used because human epidemiological studies, which form the basis of knowledge of asbestos health effects, measured asbestos fiber concentrations using phase contrast microscopy (PCM) analytical methods. PCME is the standard term for fibers counted by more modern analytical methods that are of equivalent size to those fibers that would be seen by PCM analysis, and includes fibers with a length to width aspect ratio of 3:1 or greater. Use of the PCME classification allows comparisons to the existing epidemiological data on asbestos related cancers.

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Fiber Bundles	The R.J. Lee Group excluded bundles from its statistical analysis of the EPA air samples.	<p>1) Exclusion of bundles further reduces the fiber concentrations of the El Dorado air samples.</p> <p>2) Exclusion of bundles biases the R.J. Lee Group's statistical analysis to make it appear that the structures counted by EPA are non-asbestiform.</p>	All of the established EPA, NIOSH, and ISO analytical methods require the counting of asbestos bundles, recognizing the significance of bundles to proper characterization of asbestos fiber levels.	<p>a) Bundles are two or more attached parallel asbestos fibers which can have a significant health impact when they are inhaled and separate into individual fibers.</p> <p>b) Bundles were counted in the historical epidemiological studies which form the basis of our knowledge of asbestos-related health effects and EPA's IRIS database.</p>

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Aluminum	There is too much aluminum in 63% of fibers identified by EPA in the El Dorado Hills air samples for the fibers to be asbestiform.	Exclusion of 63% of the fibers counted in the EPA air samples greatly reduces the reported asbestos concentration levels.	<p>a) Aluminum content is not a primary criteria for classification of a mineral structure as asbestos.</p> <p>b) The EPA laboratories used the standard protocols for identification of asbestos structures.</p> <p>c) The R.J. Lee Group did not have access to the EPA air samples. The limited number of spectra the R.J. Lee Group reviewed were of EPA's environmental asbestos air samples from disturbed soil. Non-asbestos particles from the soil, particularly clay particles, can influence the total aluminum in the spectra.</p> <p>d) The references cited by R.J. Lee Group to support the aluminum position do not actually support the position or are not credible.</p>	<p>a) and b) The EPA laboratories used the International Mineralogical Association (IMA) guidelines, the international standard for amphibole nomenclature. It is the number and position of silica atoms on the tetrahedral site of the mineral structure which primarily determines the amphibole classification. Use of the IMA guidelines for classification is recommended in EPA analytical methods and was used by USGS to classify the Libby, MT amphiboles.</p> <p>c) All three R.J. Lee Group references agree that it is the IMA guidelines which primarily govern the classification of amphibole type.</p>

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<p>Extinction Angles*</p> <p>*The extinction angle of a fiber evaluated by polarized light microscopy is one of many criteria used to identify mineralogical composition. The extinction angle for amphibole asbestos fibers is the difference in degrees between the long axis of the fiber and the angle at which the fiber optically disappears (the polarization direction where the light passing through it becomes "extinct") when the fiber is rotated under a polarized light microscope.</p>	<p>According to the R.J. Lee Group, amphibole asbestos fibers have a zero-degree extinction angle. The extinction angles of the fibers EPA found in the El Dorado Hills soil samples averaged 12°, as calculated by R.J. Lee Group, and therefore EPA misidentified non-asbestos cleavage fragments as amphibole fibers.</p>	<p>If amphibole asbestos fibers have zero-degree extinction angles, then none of the fibers EPA identified in the El Dorado Hills soil samples are actually asbestos.</p>	<p>a) The R.J. Lee Group's conclusion regarding extinction angles is contradicted by the National Institute of Standards and Technology (NIST)</p> <p>b) The R.J. Lee Group's conclusion is contradicted by the major analytical methods used for analysis of asbestos in soil and bulk samples, including the methods of EPA and NIOSH.</p>	<p>a) The NIST asbestos sample standard, which laboratories use for calibration, states that tremolite asbestos can have an extinction angle of up to $16.6 \pm 0.3^\circ$ and that the actinolite asbestos can have an extinction angle of up to $15.9 \pm 0.2^\circ$.</p> <p>b) EPA Method 600/R-93/116, the standard method used by all NIST/NVLAP accredited laboratories to test building materials for the presence of asbestos, states that tremolite-actinolite asbestos has extinction up to 21°. NIOSH Method 9002, the method used for analysis of the El Dorado Hills soil samples, states that tremolite-actinolite asbestos has extinction of 10-20°.</p>